

Application Number 10/650,121
Response to Office Action mailed August 3, 2007

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended) A computer-implemented method comprising:
defining a primal linear programming formulation of a support vector machine classifier;
solving an exterior penalty function of a dual of the primal linear programming
formulation to produce a solution to the primal linear programming formulation of the support
vector machine classifier; and
selecting an input set for the support vector machine classifier based on the solution.

Claim 2 (Original) The method of claim 1, further comprising minimizing the exterior penalty
function for a finite value of a penalty parameter.

Claim 3 (Currently Amended) The method of claim 1, wherein the primal linear
programming formulation is a 1-norm linear programming formulation.

Claim 4 (Original) The method of claim 1, wherein the solution is a least 2-norm solution.

Claim 5 (Original) The method of claim 1, wherein the support vector machine classifier is a
linear support vector machine classifier, and selecting an input set includes selecting a set of
input features of the linear support vector machine classifier.

Claim 6 (Original) The method of claim 1, wherein the support vector machine classifier is a
nonlinear support vector machine classifier, and selecting an input set includes selecting a set of
kernel functions for the nonlinear support vector machine classifier.

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Claim 7 (Previously Presented) The method of claim 1, further comprising:
calculating a separating surface based on the input set and the support vector machine classifier; and
classifying data using the separating surface.

Claim 8 (Original) The method of claim 7, further comprising classifying the data into two sets of data using the separating surface.

Claim 9 (Currently Amended) The method of claim 7, wherein the separating surface is one of an n-dimensional hyperplane and ~~or~~ a nonlinear surface.

Claim 10 (Original) The method of claim 1, further comprising applying a Newton-based algorithm to solve the exterior penalty function.

Claim 11 (Original) The method of claim 1, further comprising applying one or more linear constraints to the solution of the exterior penalty function.

Claim 12 (Original) The method of claim 1, wherein selecting an input set includes selecting a subset of input features from a larger set of input features that is substantially larger than the subset of input features.

Claim 13 (Original) The method of claim 12, wherein the subset of input features includes less than approximately one percent of the larger set of input features.

Claim 14 (Original) The method of claim 12, wherein the subset of input features includes less than approximately .1 percent of the larger set of input features.

Claim 15 (Original) The method of claim 12, wherein the larger set of input features includes more than 20,000 input features, and the subset of input features includes less than ten input features.

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Claim 16 (Currently Amended) A classification system comprising:
a processor that applies a primal linear programming formulation of a support vector machine classifier to classify data based on an input set; and
an input module that generates the input set based on a solution of an exterior penalty function of a dual of the primal linear programming formulation.

Claim 17 (Original) The system of claim 16, wherein the input module generates the input set based on a minimization of the exterior penalty function for a finite value of a penalty parameter.

Claim 18 (Currently Amended) The system of claim 16, wherein the primal linear programming formulation is a 1-norm linear programming formulation.

Claim 19 (Original) The system of claim 16, wherein the solution is a least 2-norm solution.

Claim 20 (Original) The system of claim 16, wherein the support vector machine classifier is a linear support vector machine classifier, and the input set includes a set of input features of the linear support vector machine classifier.

Claim 21 (Original) The system of claim 16, wherein the support vector machine classifier is a nonlinear support vector machine classifier, and the input set includes a set of kernel functions for the nonlinear support vector machine classifier.

Claim 22 (Previously Presented) The system of claim 16, wherein the processor calculates a separating surface based on the input set and the support vector machine classifier, and classifies data using the separating surface.

Claim 23 (Original) The system of claim 22, wherein the processor classifies the data into two sets of data using the separating surface.

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Claim 24 (Currently Amended) The system of claim 22, wherein the separating surface is one of an n-dimensional hyperplane and ~~[[or]]~~ a nonlinear surface.

Claim 25 (Original) The system of claim 16, wherein the input module applies a Newton-based algorithm to solve the exterior penalty function.

Claim 26 (Original) The system of claim 16, wherein the solution to the exterior penalty function is subject to one or more linear constraints.

Claim 27 (Original) The system of claim 16, wherein the input set is a subset of input features selected from a larger set of input features that is substantially larger than the subset of input features.

Claim 28 (Original) The system of claim 27, wherein the subset of input features includes less than approximately one percent of the larger set of input features.

Claim 29 (Original) The system of claim 27, wherein the subset of input features includes less than approximately .1 percent of the larger set of input features.

Claim 30 (Original) The system of claim 27, wherein the larger set of input features includes more than 20,000 input features, and the subset of input features includes less than ten input features.

Claim 31 (Currently Amended) A computer-readable medium comprising instructions to cause a processor to:

define a primal linear programming formulation of a support vector machine classifier;
solve an exterior penalty function of a dual of the primal linear programming formulation to produce a solution to the primal linear programming formulation of the support vector machine classifier; and
select an input set for the support vector machine classifier based on the solution.

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Claim 32 (Original) The computer-readable medium of claim 31, further comprising instructions to cause a processor to minimize the exterior penalty function for a finite value of a penalty parameter.

Claim 33 (Currently Amended) The computer-readable medium of claim 31, wherein the primal linear programming formulation is a 1-norm linear programming formulation.

Claim 34 (Original) The computer-readable medium of claim 31, wherein the solution is a least 2-norm solution.

Claim 35 (Original) The computer-readable medium of claim 31, wherein the support vector machine classifier is a nonlinear support vector machine classifier, and the input set includes a set of input features for the linear support vector machine classifier.

Claim 36 (Original) The computer-readable medium of claim 31, wherein the support vector machine classifier is a nonlinear support vector machine classifier, and the input set includes a set of kernel functions for the nonlinear support vector machine classifier.

Claim 37 (Previously Presented) The computer-readable medium of claim 31, further comprising instructions to cause a processor to:

- calculate a separating surface based on the input set and the support vector machine classifier; and
- classify data using the separating surface.

Claim 38 (Original) The computer-readable medium of claim 37, further comprising instructions to cause a processor to classify the data into two sets of data using the separating surface.

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Claim 39 (Original) The computer-readable medium of claim 37, wherein the separating surface is one of an n-dimensional hyperplane and a nonlinear surface.

Claim 40 (Original) The computer-readable medium of claim 31, further comprising instructions to cause a processor to apply a Newton-based algorithm to solve the exterior penalty function.

Claim 41 (Original) The computer-readable medium of claim 31, further comprising instructions to cause a processor to apply one or more linear constraints to the solution of the exterior penalty function.

Claim 42 (Original) The computer-readable medium of claim 31, further comprising instructions to cause a processor to select a subset of input features from a larger set of input features that is substantially larger than the subset of input features.

Claim 43 (Original) The computer-readable medium of claim 42, wherein the subset of input features includes less than approximately one percent of the larger set of input features.

Claim 44 (Original) The computer-readable medium of claim 42, wherein the subset of input features includes less than approximately .1 percent of the larger set of input features.

Claim 45 (Original) The computer-readable medium of claim 42, wherein the larger set of input features includes more than 20,000 input features, and the subset of input features includes less than ten input features.

Claim 46 (Previously Presented) The method of claim 1, further comprising applying the support vector machine classifier to classify data relating to one of fraud detection, credit evaluation, gene expression, intrusion detection, medical diagnosis or medical prognosis.

Claim 47 (Previously Presented) The method of claim 1, further comprising applying the support vector machine classifier to classify data relating to multiple myeloma.

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Claim 48 (Previously Presented) The method of claim 1, further comprising applying the support vector machine classifier to classify data relating to absolute call measurements for multiple myeloma.

Claim 49 (Previously Presented) The system of claim 16, wherein the processor applies the support vector machine classifier to classify data relating to one of fraud detection, credit evaluation, gene expression, intrusion detection, medical diagnosis or medical prognosis.

Claim 50 (Previously Presented) The system of claim 16, wherein the processor applies the support vector machine classifier to classify data relating to multiple myeloma.

Claim 51 (Previously Presented) The method of claim 16, wherein the processor applies the support vector machine classifier to classify data relating to absolute call measurements for multiple myeloma.

Claim 52 (Previously Presented) The computer-readable medium of claim 31, wherein the instructions cause the processor to apply the support vector machine classifier to classify data relating to one of fraud detection, credit evaluation, gene expression, intrusion detection, medical diagnosis or medical prognosis.

Claim 53 (Previously Presented) The computer-readable medium of claim 31, wherein the instructions cause the processor to apply the support vector machine classifier to classify data relating to multiple myeloma.

Claim 54 (Previously Presented) The computer-readable medium of claim 31, wherein the instructions cause the processor to apply the support vector machine classifier to classify data relating to absolute call measurements for multiple myeloma.

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Claim 55 (Currently Amended) A support vector machine classification system comprising:
a data storage medium storing input data for classification;
a support vector machine classifier that classifies the input data into a first set of data and a second set of data based on a set of input features; and
a selection module that produces a reduced set of input features for the support vector machine classifier based on a minimization of an exterior penalty function of a dual of a primal linear programming formulation of the linear support vector machine classifier for a finite value of a penalty parameter.

Claim 56 (Currently Amended) The system of claim 55, wherein the selection module includes:
a dual generator that generates the dual of the primal [[a]] linear programming formulation of the linear support vector machine classifier; and
an exterior penalty function solver that minimizes the exterior penalty function of the dual; and
a feature generator that generates the reduced set of input features for the support vector machine classifier.

Claim 57 (Previously Presented) The system of claim 55, wherein the support vector machine classifier classifies data relating to one of fraud detection, credit evaluation, gene expression, intrusion detection, medical diagnosis or medical prognosis.